

frequencies that are much less congested and that could be considered for MSS feederlinks. For example, CMC urges that consideration be given to the 5000-5250 MHz ARNS band and to lightly used FSS bands, such as the 6650-6725 MHz or the 7025-7075 MHz band. The Commission also may wish to propose the use of C-band (6725-7025 MHz) and Ku-band (10.7-10.95 GHz or 11.2-11.45 GHz) frequencies from the Allotment Plan bands in the RBW mode, which TG 4/5 has shown are good candidates for non-GSO MSS feederlinks because sharing with MSS is technically feasible. Despite the attractiveness of Allotment Plan bands in conjunction with the RBW mode, the dynamics at WRC-95 may preclude an allocation decision to implement MSS feederlinks within these bands. As a contingency, CMC would recommend that U.S. proposals to WRC-95 identify alternative C-band or Ku-band FSS allocations in which it will be feasible to operate MSS feederlinks in the RBW mode. At this stage CMC is participating in the IAC IWG-4 to develop selection criteria for identifying the most promising candidate bands for MSS feederlinks.

Aside from considering the feasibility of sharing MSS feederlink with GSO/FSS systems, IWG-4 also will consider whether sharing is feasible between multiple MSS systems and between MSS and services other than FSS. CMC believes that these studies will indicate that there is an urgent need for additional feederlink spectrum to support MSS operations.

**C. Review of the Technical Constraints Associated with Frequency Bands Below 3 GHz Allocated to MSS at WARC-92**

The third item on the WRC-95 agenda of particular concern to the MSS community is Item 2.1(a) which calls for a review of the

technical constraints imposed on the frequency bands below 3 GHz that have been allocated at WARC-92 to MSS.<sup>21</sup> Facilitating the introduction of MSS worldwide in the newly allocated bands below 3 GHz will be a difficult task as these frequency bands are now being used by existing services. Accordingly, CMC believes that the issue of MSS sharing spectrum with existing terrestrial fixed services ("FS"), and the need to modify or remove possible constraints on future MSS operations below 3 GHz should be given careful study.

At present, several study groups within the ITU are addressing these technical issues. In particular, TG 2/2 has been tasked with drafting recommendations which are intended to establish sharing criteria for MSS and other services operating in the bands below 3 GHz. The group's recommendations likely will consist of either: 1) "trigger levels", that is, MSS satellite power flux density ("PFD") levels or FS EIRP levels which, if exceeded, would require the need for coordination, or (2) "absolute PFD or EIRP limits", which would protect both terrestrial and satellite services and systems operating in the bands below 3GHz and would obviate the need for coordination.

At this stage in the ITU-R process there is a conflict between terrestrial and satellite interests on this issue. The FS industry is supporting the use of absolute PFD limits on MSS satellite downlinks and the imposition of large separation distances from

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<sup>21</sup>WRC-95 NOI, Attachment 1, at 2. In response to the Commission's inquiry at footnote 17 of the NOI, we see no need for Global Maritime Distress and Safety System ("GMDSS") issues to be discussed at WRC-95 because the L-band is not on the agenda and there is no need to identify it with any new MSS bands.

mobile earth stations ("MES") to protect terrestrial FS stations. On the other hand, MSS interests are advocating "trigger levels" that are less stringent than the "absolute limits" advocated by the terrestrial community and are seeking coordination distances between the MESs and the terrestrial stations that are smaller than the separation distances being proposed by the FS industry.

In light of the different views held by the MSS community and FS service providers and the expectation that MSS development will be progressive, it may be prudent for the Commission to advocate that additional studies be undertaken in the ITU forum with the objective of developing a transition plan for the 2 GHz MSS bands. CMC believes that these studies may indicate that various portions of the spectrum within 2 GHz MSS space-to-earth bands may be suitable for different types of shared services, while in other blocks of spectrum, band segmentation should be utilized in lieu of co-equal sharing.

Many countries implement their FS systems in accordance with specific ITU-R recommendations for FS channelization plans. For example, the newer digital FS networks are highly susceptible to interference, but under ITU-R Recommendation No. 283-5 these FS systems operate only in the lower portions of the MSS 2 GHz bands (2173-2284 MHz). Therefore, it is likely that countries operating these systems would not object to MSS downlink in the upper portion of the 2 GHz downlink -- that is, at 2184-2200 MHz.

In addition, MSS systems will be vulnerable in their uplink band to interference from FS transmitters. For example, Electronic

News Gathering ("ENG") operations in the United States are permitted to operate in the 1990-2110 MHz auxiliary broadcast band.<sup>22</sup> CMC has conducted measurements which confirm that ENG trucks which are transmitting FM-TV carriers occupying 18 MHz with 12 watts at the input to the antenna will present substantial interference to MSS satellite uplink receivers which will, in effect, create a wall of noise across most of the 1990-2010 MHz global MSS uplink band. Accordingly, CMC urges the Commission to move expeditiously to establish a proceeding to resolve these issues through the adoption of sharing criteria for MSS and ENG operations or the development of an alternative channeling plan that will accommodate both ENG and MSS operations. Thus, this one example of terrestrial/satellite incompatibilities in the 2 GHz MSS band underscores our assertion above that the United States should explore the current and future terrestrial usage and occupancy of the 2 GHz MSS bands with a view to developing a spectrum transition plan that will benefit both satellite and terrestrial services.

### **III. MSS SERVICE LINK SPECTRUM REQUIREMENTS**

COMSAT agrees with the Commission's view, as stated in paragraph 27 of the NOI, that usable MSS service link spectrum in the bands below 3 GHz will be difficult to identify and to allocate worldwide. The same sentiment appears to be embodied in WRC-95 Agenda Item 3(d) which contemplates that requirements for MSS

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<sup>22</sup>The United States is the only country of the 180 ITU countries that uses the 1990-2100 MHz band for quasi-mobile TV auxiliary broadcast operation. See 47 C.F.R. § 74.602(F).

service and feeder links be acted on at WRC-97, but entertains the possibility that "if necessary" limited MSS allocations could be made in 1995. Nonetheless, CMC is hopeful that a compelling basis for additional MSS allocations can be made at WRC-95 and, if the new allocations are not enacted at WRC-95, then that they may be finally adopted at WRC-97.

Highlighted below are some of CMC's preliminary thoughts on the future demand for MSS services, an indication of the amount of additional MSS spectrum likely to be required, and the frequencies at which future MSS allocations might be located. CMC believes that a more considered approach to these questions will be developed within the IAC over the next six months, a process in which CMC is already actively engaged along with the representatives of other U.S. companies which intend to provide MSS services either domestically or internationally.

**A. The Status of MSS Allocations Following WARC-92**

At WARC-92 the United States went into the Conference proposing not only MSS allocations for the RDSS bands at 1610-1626.5 and 2483.5-2500 MHz, but also an additional 40 MHz of worldwide, primary MSS allocations in each direction in the S-band at 2390-2430 MHz (uplink) and 2110-2130 MHz and 2160-2180 MHz (downlink). In addition to the MSS band proposals, the United States also proposed an allocation footnote to add MSS to the band 1850-1990 MHz. The rationale for this latter proposal was that it would complement existing terrestrial services by permitting greater sharing of the band and promoting the development of a variety of personal

communications services.<sup>23</sup>

Following WARC-92, the original U.S. MSS allocations proposals for 40 MHz of spectrum at S-band were reconfigured into a pair of 30 MHz global and 10 MHz regional MSS allocations in the bands at 1970-2010 MHz (uplink) and 2160-2200 MHz (downlink). Recently, the Commission on reconsideration in its PCS Order sought to preserve the 2180-2200 MHz band for MSS downlink allocations.<sup>24</sup> However, the same Order also removed 20 MHz of MSS spectrum in the uplink band at 1970-1990 MHz from potential consideration for MSS.

As a consequence of the Commission's decisions in the PCS Docket, the MSS Industry, along with other affected services, including (potentially) the broadcast auxiliary service, will have to search for alternative spectrum in order to compensate for the removal of 20 MHz of the MSS uplink band. Thus, while all 30 MHz of the 2 GHz global MSS downlink allocations are available for MSS at least on paper, only 20 MHz of uplink spectrum and 20 MHz of downlink spectrum can actually be utilized in the United States.<sup>25</sup>

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<sup>23</sup>See U.S. Dept. of State, United States Proposals for the 1992 World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum, July 1991, Dept. of State Publication 9903., pages 4-5.

<sup>24</sup> PCS Order at para. 96.

<sup>25</sup>Our analysis assumes that the Commission follows through on its commitments at paragraph 97 of the PCS Order "to initiate a proceeding to investigate these additional ... (MSS) ... allocation possibilities in the near future, with the purpose of accommodating MSS operations within the remaining internationally designated bands ... [and] ... to pursue additional international allocations for MSS at WRC-95." Id. at para. 97.

## **B. Additional MSS Spectrum Requirements**

Within the ITU process, the Conference Preparatory Meeting has requested that TG-8/3 address the following three MSS issues:

- 1) develop estimates of projected MSS service-link spectrum requirements;
- 2) identify approximate locations for MSS allocations; and
- 3) identify possible timings for MSS access to future MSS allocations.

At this stage in the process, CMC has not seen significant input by either the United States or foreign ITU-R participants on any of these items; but, perhaps some input documentation will be forthcoming in the second round of TG-8/3 meetings to be held later this month in Toronto, Canada. The United States needs to focus quickly on these items in order to receive favorable consideration of its position on new MSS spectrum allocations by the CPM and consequent action on these items at WRC-95.

Projections for future MSS spectrum requirements were developed earlier by IWP-8/15 and the WARC-92 Joint International Working Party ("JIWP92"), based on input from the MSS user communities and organizations such as the ICAO and the IMO. These projections, reproduced in Attachment 3 herein, were drawn out to the year 2010 and forecasted a total "minimum" MSS spectrum requirement of 88.8 MHz of paired spectrum and a "likely" MSS requirement as high as 164.1 MHz in each direction.<sup>26</sup>

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<sup>26</sup>See Table 2 which provides a breakdown of AMS(R)S, AMSS, LMSS, MMSS, and Distress and Safety spectrum requirements, appended hereto as Attachment 3. Report of the WARC-92 Joint International Working Party, Document No. JIWP92/99-E.

Since 1991, when these estimates were produced at the JIWP92 in preparation for WARC-92, additional information has become available, especially concerning the potential market for handheld MSS terminals offering PCS. Information on the satellite-based PCS market has been developed by a number of organizations, including CMC and Inmarsat, which are in the advanced stages of formulating plans for the introduction of MSS/PCS systems capable of providing global voice services to handheld terminals. Indeed, some of these systems propose to use dual-mode terminals which can interconnect with terrestrial cellular networks in various parts of the world. Accordingly, it is expected that multiple PCS/MSS satellite networks, predominantly the non-GSO type, will be deployed within the 1.6/2.4 GHz bands by the turn of this century.

As mentioned above, Inmarsat recently has determined that it will invest in an intermediate circular orbit ("ICO") system through an affiliate in order to provide PCS/MSS services on a commercial basis in the 2 GHz MSS bands by the 1999/2000 time frame.<sup>27</sup> CMC and Inmarsat believe that the total demand for worldwide MSS spectrum, especially for handheld services, will increase very rapidly in the next decade, paralleling the spectacular growth in terrestrial-based mobile services such as cellular radio, which now comprises more than 25-million users around the world. Despite the extensive market penetration of terrestrial cellular, studies show that even by year 2000, cellular coverage will reach only 60% of the world's population and will cover only 15% of the world's land mass.

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<sup>27</sup>See supra, note 11.



Preliminary Inmarsat estimates of the market for PCS/MSS indicate that there are likely to be over one million subscribers by the year 2000, and approaching several million by the year 2010, assuming Inmarsat-P commercial hand-held service is initiated by 1999/2000.

CMC and Inmarsat believe that satellite based PCS systems, such as Inmarsat-P, will likely include the following market sectors:

- o International Business Travellers
- o National Roamers (domestic travellers outside cellular coverage)
- o Cellular Extension (dual mode handsets)
- o Transportation (vehicular)
- o Semi-fixed (particularly developing countries lacking extensive telephone infrastructure)
- o Maritime (small craft without permanent MESs)
- o Aeronautical (primarily general aviation)
- o FAX/mobile data/paging (extending existing Inmarsat services)

Other public studies have confirmed that Inmarsat's preliminary market forecasts are, if anything, a bit on the conservative side.<sup>28</sup>

Moreover, as will be documented within the IAC, it can readily be demonstrated through standard traffic/Erlang conversion formulae that the projections for several million PCS/MSS subscribers translate into a peak spectrum requirement of more than 10 MHz for a single MSS system, even when frequency reuse factors are taken into account. Assuming multiple MSS networks and a subscriber base of 20 million by year 2010, CMC believes that there certainly will be a demand for at least 100 MHz of MSS/PCS spectrum in each direction by the year 2010. This level of spectrum utilization, thus, will

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<sup>28</sup>See, e.g., KPMG Peat Marwick Main Report to the European Commission, "Satellite Personal Communications and Their Consequences for European Telecommunications, Trade and Industry", March 1994.

exceed the combined capacity of both the existing 1.6/2.4 GHz MSS bands and the WARC-92 1.9/2.1 GHz MSS bands.

**C. New MSS Spectrum is Needed to Accommodate Growth In Requirements**

Clearly, conventional MSS services for non-handheld maritime, aeronautical and land mobile operations can be provided in any of the WARC-92 allocated MSS bands with varying dates of entry for each band. This is not the case for future, non-conventional MSS/PCS type services. The 1.6/2.4 GHz bands are already rapidly filling up with proposed PCS/MSS handheld systems to be offered by non-GSO networks. Similarly, Inmarsat has targeted the 2 GHz MSS bands as its choice for deployment of PCS/MSS, including FPLMTS satellite component services, in a first-generation Inmarsat-P system to be offered by an affiliate. In all probability, the 2 GHz bands also are the preferred bands for possible second-generation MSS systems to be launched by the Big LEOs.

Given the high level of interest in these two MSS bands, it makes sense for conventional MSS services, including national and regional operators, to be accommodated in either the 1.5/1.6 GHz or the 2.5/2.6 GHz bands. However, due to the imminent saturation of the L-band, the 2.5/2.6 bands likely could better accommodate growth of MSS for national or regional systems -- other than for use in the United States where this band is not available to MSS. CMC believes that the announced deployment by 1995 of the Japanese NSTAR system at 2.5/2.6 GHz could reflect such a trend.

Satellite-based PCS services clearly are ear-marked for delivery over global-based MSS systems. Therefore, common worldwide

allocations are highly desirable for future MSS allocations in order to satisfy growth of these services. While it is early in the process, we believe that the market projected for PCS/MSS systems will definitely exceed the MSS allocations "on the books", even if all 30 MHz of global spectrum within the 2 GHz bands and the 16.5 MHz of spectrum in the RDSS bands are fully usable for MSS. Therefore, CMC expects that additional worldwide MSS spectrum will be needed sometime around the year 2000, when the capacity of both the 1.6/2.5 GHz and the 1.9/2.1 GHz bands will likely be exceeded.

CMC understands that it will be difficult at WRC-95 to seek expansion into adjacent spectrum in either the 1.6/2.4 GHz MSS bands or the 1.9/2.1 GHz bands because of the needs of other existing services. However, we are willing to work with the Commission and other parties within the IAC to develop some alternative ideas in this regard.<sup>29</sup>

#### **IV. COMMENTS ON THE REPORT OF THE VOLUNTARY GROUP OF EXPERTS**

The WRC-95 Conference has as Item 1 on its agenda a review of the final report of the Voluntary Group of Experts ("VGE") and consideration of related proposals from administrations concerned with simplifying the Table of Frequency Allocations and the other provisions of the Radio Regulations.<sup>30</sup> COMSAT's main comments on the

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<sup>29</sup>It may be possible, for example, to upgrade portions of the Region 2 Primary MSS allocations above the L-band MSS at 1675-1710 MHz, or to upgrade Region 2 Secondary MSS allocations, providing that suitable allocations can be found in the 1-3 GHz range.

<sup>30</sup>See WRC-95 NOI, Attachment 1, at 1.

VGE Report are contained in the companion filing submitted in this proceeding by COMSAT World Systems ("CWS").<sup>31</sup> CMC is particularly concerned, however, with the sheer magnitude of the task of examining the VGE Report at WRC-95 and making decisions on the proposed revisions to the Radio Regulations. Our concern is that the VGE agenda item could consume the resources and time available to the Conference and unduly distract the Conferees from consideration of the MSS issues which we believe must be resolved at WRC-95.

Accordingly, CMC believes that the Commission should consider ways in which the Conference could be structured so as to avoid the possibility that consideration of the VGE issues will overrun other important items on the WRC-95 agenda. For example, the Commission may wish to propose that the VGE issues be considered in a separate committee at the Conference and that a time limit be placed on the debate of these issues at the plenary sessions. Moreover, it may be appropriate to reach an understanding at the outset of the Conference that those VGE issues requiring long debate could be postponed and considered at WRC-97 after further work and consultation with those Members who have particular concerns about those items. This would help to alleviate delay caused by prolonged debate on particular VGE issues.

Because of the immediate need to resolve issues of concern to the MSS industry, CMC urges the Commission to plan ahead and make

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<sup>31</sup>See Comments of COMSAT World Systems, filed July 15, 1994, in this proceeding ("CWS Comments").

provisions to ensure that the VGE issues do not preclude full consideration of MSS agenda issues. Should any WRC-95 issues need to be carried over to future Conferences, U.S. interests will be better served if decisions on the VGE issues are postponed and there is no delay in resolving the MSS issues which are vital to the development of the MSS industry.

#### **V. RECOMMENDATIONS FOR THE WRC-97 CONFERENCE AGENDA**

WRC-95 will develop and recommend to the ITU Council a final agenda for WRC-97 and a preliminary agenda for WRC-99. CMC believes that some of the MSS related issues on the WRC-95 agenda will require further consideration at WRC-97.<sup>32</sup> Specifically, it is likely that some allocations for MSS feeder links will be made at WRC-95 and that other allocations may need to await final action at WRC-97. Moreover, we believe that it will prove difficult for WRC-95 to adopt new MSS service band allocations given the importance of facilitating the use of the MSS bands already allocated at WARC-92 and the urgency attached to making these bands available for use before the year 2000. While new MSS allocations are of critical importance for future market expansion, WRC-95 will do well, in our view, to set the stage for final adoption of new allocations at WRC-97. Therefore, sufficient time should be provided on the WRC-97 agenda to address MSS issues that are not completed at WRC-95.

Another issue that should be addressed at WRC-97 and which

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<sup>32</sup>See WRC-95 NOI, Attachment 1, at 2.

relates to Item 2.2 already on the preliminary agenda for WRC-97 concerns the use of shipboard earth stations operating in FSS bands.<sup>33</sup> Marketplace realities and sound spectrum management require that consideration be given to accommodating broader use of terminals in the FSS bands under acceptable criteria to avoid harmful interference and protect the interests of all users sharing the bands. Therefore, we propose that the Commission include the application of shipboard earth stations in certain FSS bands on the WRC-97 agenda as part of the overall consideration of item 2.2.<sup>34</sup>

#### **VI. FCC PREPARATIONS FOR FUTURE WRCs**

The NOI at paragraph 44 seeks comments on ways that the Commission can be more responsive to the needs of the industry in preparing for future WRCs. We strongly endorse this initiative by the Commission to make its preparatory process more effective. This is particularly timely now that the 2-year cycle of WRCs has begun under the new ITU structure and schedule of conferences.

The next three WRCs will be particularly important to the mobile satellite service operators and will impact the development of new services envisioned in these emerging markets for personal mobile services. We believe that time spent now to make the preparatory process more streamlined and responsive to marketplace

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<sup>33</sup>See WRC-93 Final Acts, Resolution No. COM 4/2.

<sup>34</sup>See CWS Comments filed in this proceeding for a more extensive discussion of this proposal.

pressures will earn dividends later for the United States at future WRCs.

In this regard, CMC fully supports, and incorporates by reference, the proposals made by CWS in its filing in this proceeding and suggests that the Commission consider the following procedural changes:

- (1) Establish a continuous process for radio conference preparations that is centered in the "WRC Preparatory Office" that would be created to direct and coordinate all internal and external Commission preparations;
- (2) Place responsibility for conference preparations with the head of the WRC Preparatory Office who should name an Executive Coordinator for each of the next two WRCs (1995 and 1997), and, following WRC-95, the Executive Coordinator for WRC-99 should be named;
- (3) Create a permanent (renewable) IAC structure whose leadership positions would change after each WRC; private sector experts should continue to hold these leadership positions and the private sector should provide administrative support to the extent possible; however, the WRC Preparatory Office should have sufficient resources to provide substantial administrative support to the IAC;
- (4) Increase and highlight the Commission's current liaison activity with the IRAC, and create a more open and regular coordination process between the Commission and NTIA for WRCs; including more joint work efforts between the IAC and the IRAC at the experts level, and more common development of U.S. proposals;

- (5) Foster on-going coordination at the international level to develop common proposals for WRCs; this would be in addition to the current technical preparations that take place within the ITU-R, and could, for example, involve increased effort within CITELE to develop common proposals through a WRC Preparatory Working Group in CITELE; to be successful, the U.S. must be prepared to discuss all issues in an effort to jointly develop proposals before formal U.S. proposals are adopted; each country would of course continue to submit its own proposals to the WRCs independently with the objective that there would be a number of similar proposals as a result of the common work and exchange of information within CITELE and with other key countries before the conference.
- (6) Explore with the Department of State and NTIA the feasibility of naming the U.S. Head of Delegation well in advance of the WRC so that this person could be closely identified with the U.S. preparations; a 2-year lead time would be ideal.

## **VII. CONCLUSION**

CMC believes that the MSS items on the agenda for WRC-95 should be given top priority at the upcoming Conference. It is vitally important that WRC-95 address the issue of advancing the date of entry into force of the global MSS allocations and that it identify viable MSS feederlink and additional MSS service link spectrum.

CMC hopes that its Comments and recommendations in this proceeding will be of assistance to the Commission in developing U.S. proposals related to MSS and other issues on the agenda for



WRC-95 and in refining recommended and preliminary agendas for future Conferences. We look forward to working with the Commission and industry on these issues to further develop U.S. positions prior to the Conference.

Respectfully Submitted,

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Its Attorney

July 15, 1994

## ATTACHMENT 1

**TABLE 1: BR PUBLISHED 2 GHZ MSS SYSTEMS**

NETWORK NAME	ADMIN	GSO LOCATION	NON-GSO		FREQUENCY BAND MHz
			ORBITAL HEIGHT (km)	NO OF SATELLITES	
Inmarsat GSO	G/INM	179E,110E,64E 20E,90W,55W, 15.5W			1980-2010, 2170-2200
Inmarsat LEO	G/INM		10355	12-15	1980-2010, 2170-2200
Quasigeo-L3	D		41500/5800 max 39000/1200 min	3n for n= 1,2,3,4,5 or 6	1980-2010, 2170-2200
Prognoz-8	RUS	98E			2120-2300
Petalring 30C-S	HOL		N/A	N/A	1980-2010 2170-2200
Petalring 60E-S	HOL		N/A	N/A	1980-2010 2170-2200
F-SAT LEO	F		N/A	N/A	1980-2010 2170-2200
F-SAT ICO	F		N/A	N/A	1980-2010 2170-2200
MSSLEO-1	USA		N/A	N/A	1970-2010 2160-2200
MSSLEO-2	USA		N/A	N/A	1930-2010 2120-2200
USASAT-27B	USA	76W			1970-1990 2160-2180
USASAT-27C	USA	96W			1970-1990 2160-2180
USASAT-27D	USA	116W			1970-1990 2160-2180
USASAT-27E	USA	101W			1970-1990 2160-2180
GARUDA-3	INS	135E			1980-2010 2170-2200
GARUDA-4	INS	80.5E			1980-2010 2170-2200
TONGASAT-LEO-10000	TON		10239	3-12	1980-2010 2170-2200
TONGASAT-LEO-1200	TON		970	18-48	1980-2010 2170-2200
TONGASAT-LEO-1300	TON		1300	6-48	1980-2010 2170-2200
TONGASAT-ELL-1	TON		2903/426	12/18/24/36/48	1980-2010 2170-2200

N/A Not currently available

## ATTACHMENT 2

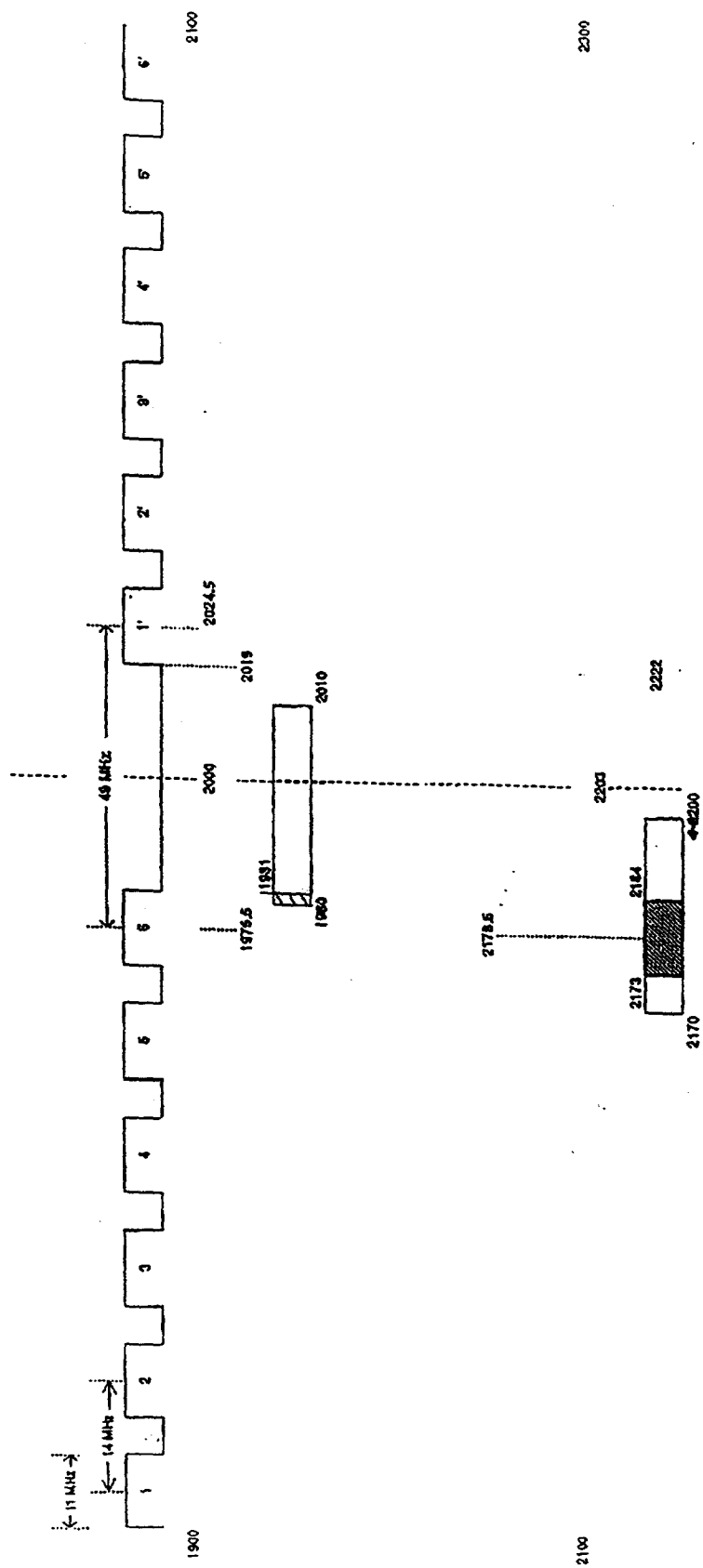


FIGURE 1. ITU-R REC. 283-5

## ATTACHMENT 3

TABLE 2

**Total spectrum requirements of the mobile-satellite services in the 1 to 3 GHz band  
in each of the directions Earth-to-space and space-to-Earth in the year 2010**

Service	Minimum Requirement MHz	Likely Requirement MHz
AMS(R)S	14.5	17.5
Other AMSS	15.0	18.0
LMSS	41.3	87.6
MMSS	17.0	40.0
Distress and Safety	1.0	1.0

These spectrum estimates are based on the needs of the geographic areas of maximum traffic with consideration of adjacent areas.

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